MONITORING DREDGED MATERIAL PLACEMENT OPERATIONS AT THE HISTORIC AREA REMEDIATION SITE DURING THE PASSENGER SHIP TERMINAL PROJECT, March–June 2003

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1.0 OBJECTIVES

During the Passenger Ship Terminal project, SAIC provided Automated Disposal Surveillance System (ADISS) technical support services under separate contracts to the dredging contractor, Weeks Marine, Inc., and to the monitoring agency, U.S. Army Corps of Engineers, New York District (NYD). ADISS was employed to monitor the placement of dredged material at the Historic Area Remediation Site (HARS; [Figure 1]). Under contract to Weeks Marine, SAIC provided the equipment, software and technical expertise to maintain the systems and process the data. For NYD the objectives were to:

- Provide real-time placement and draft information, including load misplacement and scow leakage alarms;
- Acquire, process and submit information concerning potential misplaced material events;
- Post the Inspector logs and Transportation Planning List (TPL) on the web site;
- Provide the placement grid used on the ADISSPlay vessel guidance system.

SAIC provided monitoring services to Donjon Marine and NYD for the previous Passenger Ship Terminal project during May 2002. Initial development of ADISS during the 1997 Capping Project preceded introduction of ADISSPlay, the helmsman display and vessel guidance system. The present ADISS/ADISSPlay monitoring system was managed by SAIC for NYD placing dredged material within the HARS, and the installation and maintenance of the system on the dredge scows and tugboats occurred under separate contracts with Weeks Marine.

In addition to hardware installation and maintenance, services included the daily monitoring of data transmitted via cellular telephone from the tugboats. The transmitted ADISS information was processed and made available to NYD via the ADISS web site, hosted at the SAIC Newport, RI facility. As ADISS data were received, they were processed for placement locations at the HARS grid and entered into the ADISSWeb (Internet Map Server) database. NYD personnel accessed the ADISSWeb plots posted on the web site, http://www.adiss-afiss.com/. Hardcopy plots of individual transits and vessel draft were submitted to Weeks Marine along with summaries of placement activities. Plots and copies of the Inspector logs and TPL checklists were also provided to NYD for analysis.

The objectives of this project were based upon previous project experiences and Weeks Marine and NYD needs. The requirement for daily monitoring was met by posting telemetered ADISS data on the Internet using ADISSWeb.

The position and draft data acquired from the ADISS installations were also provided on the Internet at http://www.adiss-afiss.com/ for public outreach.

SAIC programmed the placement grid for the Passenger Ship Terminal project shown in Figure 1 on the ADISSPlay system for placement guidance. The NYD provided the grid coordinates and dimensions to SAIC for this purpose.

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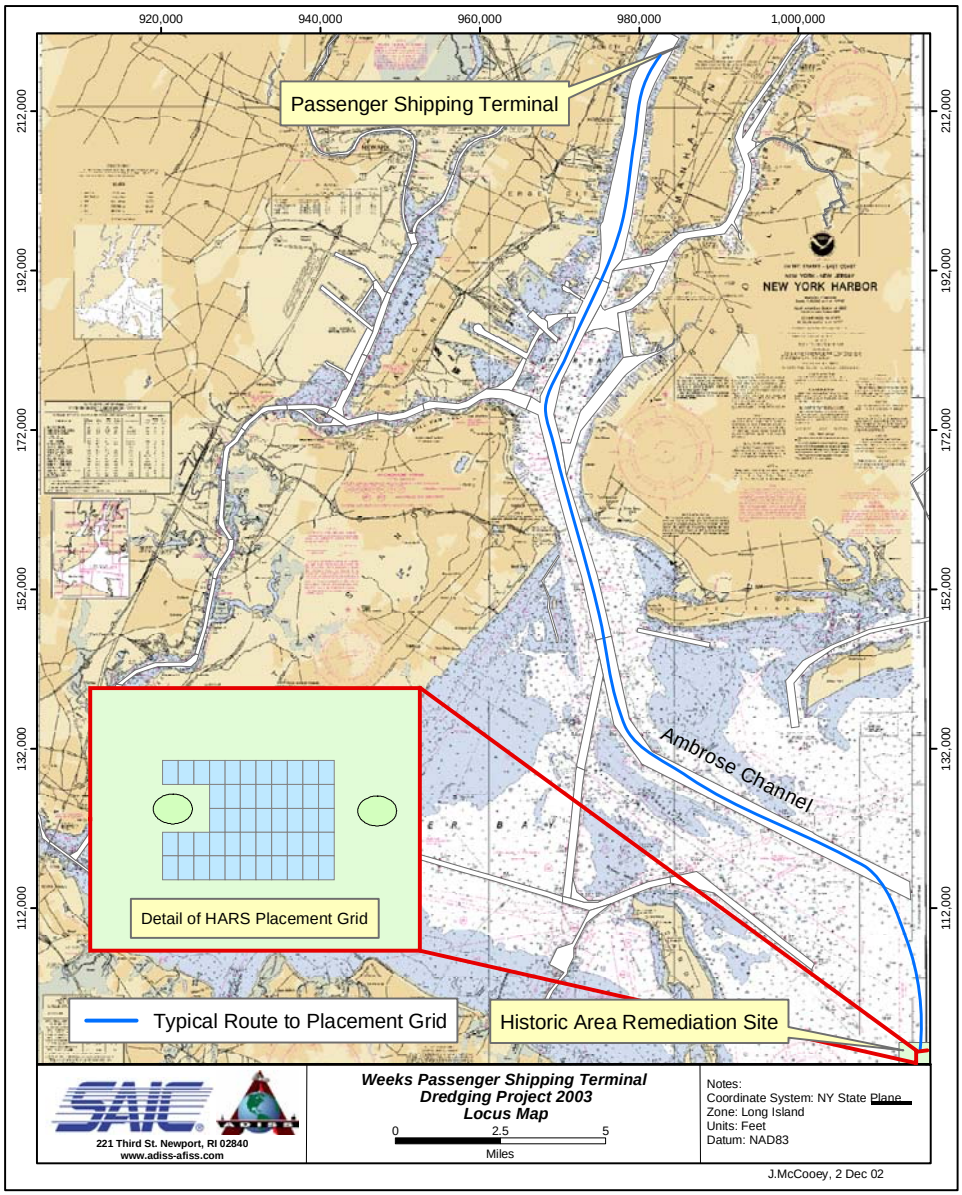

Figure 1. Passenger Ship Terminal placement at the Historic Area Remediation Site.

2.0 SYSTEM DESCRIPTION

ADISS was composed of a DGPS positioning (Wide Area Augmentation System enabled), draft recording unit and a spread-spectrum transceiver for data telemetry from the scow to the towboat. Aboard the boat, ADISSPlay consisted of a helmsman display, telemetry, and an Inspector database program. The combined ADISS/ADISSPlay system was adapted for monitoring placement operations at the HARS from previous experience at other disposal areas. ADISS/ADISSPlay data containing completed trips were telemetered via cell phone from the tugs to the SAIC Newport facility for processing and analysis. Processed data were posted on ADISSWeb for viewing by both NYD and Weeks Marine.

Prior to the Passenger Ship Terminal (PST) project, an alternative method of tracking scow transits and dredged material placements at the HARS was instituted (SAIC 2002a). In the event that communications failed with the ADISS unit installed on the scow, the Inspector would be able to switch to an alternate that estimated the scow position from the tugboat GPS unit and the layback distance to the towed scow. The alternative program, ADISSLt, could be used to track the scow until the problem was solved before the next transit took place. In addition to utilizing the ADISSLt program, the Inspector was instructed to notify SAIC of the problem, so corrective action could be taken in a timely manner.

A description of the ADISS system was available in the report of the prototype system (SAIC 1998a), and the ADISSPlay system, including the Inspector log function was described in a letter report (SAIC 19998b). Both systems have undergone extensive changes with advances in technology to increase the reliability of recording and transmitting data. Since the previous PST project, a second version of ADISS (V-2) was developed, which utilized a more reliable DGPS receiver and stored the data with less power. The new DGPS receiver was the Garmin Model 16 DGPS (WAAS enhanced). DGPS position and pressure data were recorded with a Persistor CF-1 PCMCIA recorder. Data were transmitted to the tugboat with spread-spectrum, frequency hopping Freewave radio modems. Power for ADISS was provided with an internal 12 amp-hour battery recharged by a 10-watt solar panel, allowing ADISS to operate automatically to record the transit and placement locations at the HARS.

The ADISSPlay system was modified to include the TPL checklist of items necessary for the successful shipping of each scow load to the HARS. Exceptions to the list were noted by the Inspector at different phases of each transit, and a record was transmitted to ADISSWeb for display at the end of each placement.

During the PST project, the Internet display of placement events was maintained to monitor daily disposal activities without visiting the installations to retrieve the stored data for each event. The cellular telephone data transmissions received from ADISSPlay were automatically plotted and posted on the ADISS web site using ADISSWeb. Figure 2 shows the ADISSWeb display of data available at http://www.adiss-afiss.com/.

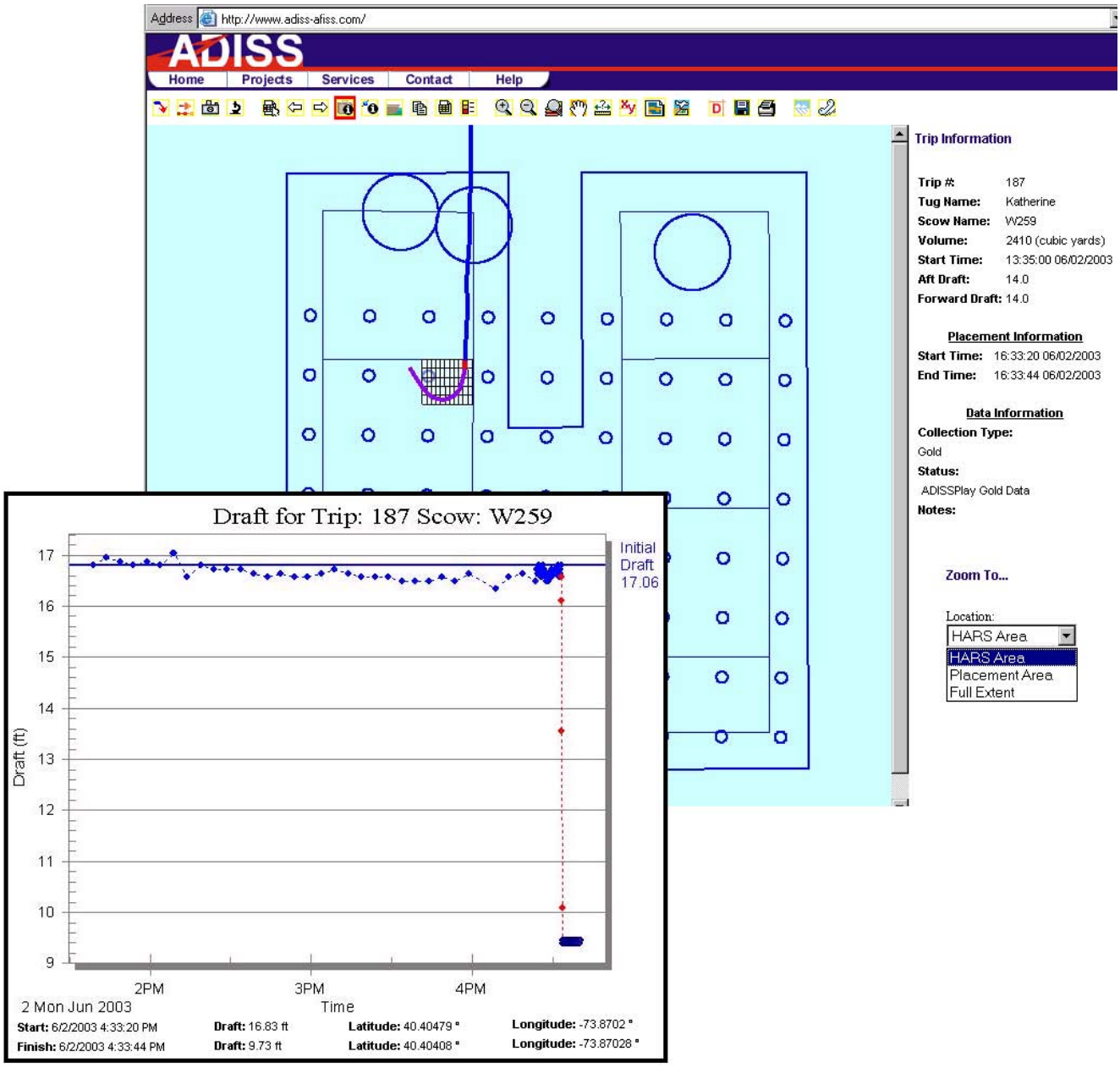

Figure 2. ADISS position and draft information displayed for viewing on ADISSWeb.

The purpose of remote reporting was to provide NYD with a means of detecting leaking scows and potential misplacements outside the permitted area quickly without deploying technical personnel to recover the data. Automated subroutines checked the incoming data, and broadcast e-mail alarms if they exceeded the pre-set thresholds for placement or leakage. E-mail warnings consisted of a notification of trip number, date and time. NYD personnel could then query the ADISS web site for misplacement times and positions, as well as plots of position and vessel draft during transit. The automatically processed data were unconfirmed until checked for accuracy by SAIC. Unconfirmed data, automatically posted on the web site prior to the QA checks were labeled as preliminary data. The label was removed from the display once the data were checked for accuracy. By monitoring the Internet, leaking scows and misplacements could be confirmed by NYD in a timely manner, and a solution could be reached with the dredging contractor.

Data processed from the transmitted ADISSPlay database were plotted on a weekly basis at SAIC and submitted to the dredging contractors within a few days by hardcopy report.

After the completion of the project, SAIC produced plots of the transit and draft data, which were posted on ADISSWeb for public outreach. In addition to the graphics, access to this report was made available to the public on the ADISS web site in '.pdf' format.

3.0 FIELD SERVICES AND DATA PROCESSING

The Passenger Ship Terminal project began on March 28, 2003, when Weeks Marine shipped the first load of maintenance dredge material to the HARS. ADISS units were installed aboard scows *W-259* and *W-254*, and soon after on *W-261*, when the *W-254* was removed from service due to leakage problems. Later during the project, an ADISS unit was installed aboard the *W-260*, when other leakage problems occurred in the existing scows. ADISSPlay units were installed aboard the tugs *Matthew, Elizabeth, Stephen Dann,* and *Katherine* over the course of the nine-week project, which ended June 3, 2003.

ADISS/ADISSPlay successfully monitored over 99% of all 181 placements. One trip was recorded with the ADISSLt version of the tracking software, when the Inspector was unable to maintain communications with the scow just prior to placement. In this case, the alternate program estimated the scow position from the tug GPS and the layback distance to the scow. Without draft information, ADISSLt depended on input from the Inspector to mark a placement event. Once the scow communications were restored by SAIC engineers through the cellular link, ADISSPlay was reset to its default values, and the scows were tracked directly from ADISS signals aboard the scows.

Trip #7 was not recorded with ADISSPlay, because most of the material had escaped through a leak (*W-261*), tripping the threshold for placement prematurely. The Inspector did not activate ADISSLt, so the log points recorded in the Inspector log were used to locate the position of the placement at the HARS.

During the previous Passenger Ship Terminal project, March-April 2002, 81 trips were successfully recorded out of a project total of 82 trips to the HARS (SAIC, 2002).

Plots of each placement and draft record are available on the ADISS web site http://www.adiss-afiss.com/, and can be accessed by choosing a trip number. All show the accurate placement within the designated target grid, except for trip #53, which occurred south of the last cell in the grid series. Figure 3 is a summary plot of all 181 recorded trips. The maintenance material dredged from the PST project contained significant volumes of water, decreasing the disposal time over the target cells to seconds instead of minutes. The missed placement during trip #53 may have been a result of a delay in the opening of the scow, common to most large hydraulic mechanisms.

Figure 3. Summary of 181 placements at the Historic Area Remediation Site, Priority Area #2 during the Passenger Ship Terminal project, March-June 2003. (Note the establishment of a fish tracking station within the grid after placement operations began.)

4.0 SUMMARY AND RECOMMENDATIONS

The following summarizes the results of monitoring the placement operations at the HARS during the Passenger Ship Terminal project:

- ADISS units aboard four scows recorded 99% of all 181 placements, and ADISSPlay recorded over 99% of all transits to the HARS.

- The ADISS/ADISSPlay-telemetered data provided near real-time updates on the Internet of daily placement activities to NYD using the ADISSWeb program, and detected several leaks during the project.

- The use of cellular technology also allowed remote trouble shooting and remote training of Inspectors. ADISS engineers rectified a few errors during the project by remotely manipulating the ADISSPlay computers aboard the tugs from the SAIC Newport facility. This saved the project data and significant transit time to the site.

- Plots of placements and draft records were posted on the Internet for public outreach.

- Transmitted the Inspector log information along with the TPL checklist information and the ADISS data for Internet display.

The following recommendations are suggested to improve HARS management operations:

- Change the method of data transmittal from the tugs to a string-based method utilizing FTP, and eliminate the problems with transmitting whole databases with PC Anywhere™.

- Assign trip numbers remotely from a land-based central computer, and avoid confusion between multiple tugs and Inspectors.

- Transmit cell eligibility data through the cellular link from a central computer, and display the information to the helmsman for selection of the optimum target with regard to mechanical, sea and weather conditions.

5.0 REFERENCES

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